# Section 1: The Cause of Externality

As mentioned in the previous lecture, welfare economics likes to criticize market failure and provides a seemingly scientific basis for government to regulate (intervene with) the market. Monopoly is said to be one kind of market failure, which is wrong and been refuted in Lecture 16. There is another kind of market failure called “Externality”.

The “external economy” or “external diseconomy” introduced in Lecture 15 is somewhat similar to externality, but not quite the same. Externalities arise when individuals or firms are involuntarily affected, either favorably or unfavorably, by the decisions of another party – where the decision-maker causing the externality is not penalized for the damage he imposes upon others or rewarded for any benefits conferred. It is generally believed that although “external (dis) economy” is also a kind of externality, it is pecuniary (monetary) externality because it will not cause the divergence between private cost and social costs, not like the direct or technological externality.

Factory pollution is often cited as a typical example of the externality that causes the divergence between private and social costs. There are costs in the factory production (such as purchasing raw materials, renting factories, machinery and equipment, paying workers’ wages, etc.), and in addition, it also causes various pollutions such as air, noise pollution, and possibly water pollution, etc that damage the environment and there are also costs. However, the factory only calculates the former costs (private costs), and does not care about the costs of environmental pollutions (external costs). Therefore, the so-called “optimal” output calculated according to the equal marginal principle (MR＝MC) is not optimal for the society (Pareto-optimal). The social costs of factory production is sum of the private costs borne by the factory itself and the external costs that it does not bear, so the social costs are greater than the private costs. This divergence between private and social costs is precisely a kind of externality: the residents nearby are involuntarily affected unfavorably by the pollutions of the factory production, and the factory does not bear the costs of the damage on the environment.

When there is divergence between private and social costs, the optimal output satisfying the equilibrium condition of MR＝MC for the whole society should be lower than that when only the private costs are calculated. Because the social costs (including external costs) are higher than the private costs (the MC is higher), according to the law of increasing marginal cost, the optimal output needs to decrease to make the MR equal to the higher MC. In other words, the factory’s optimal output for itself is actually too high for the society, which deviates from the equilibrium condition or optimality. Welfare economics thinks it to be “inefficient” and be not Pareto-optimal. The too much output of the factory is produced at the cost of polluting the environment and harming the interests of the residents nearby, and the external costs are marginally higher than the MR of the factory. Thus, welfare economics criticizes that the free market will cause the divergence between private and social cost (externality) that is a kind of market failure, and government should intervene with it by taxing the factory so that the tax bearing are equal to the external costs of pollutions and the factory will reduce the output to the level that conforms to the social optimum (Pareto-optimality).

Externalities are not always harmful (social costs are not always higher than private costs), and may also be beneficial (social benefits may be higher than private benefits). For example, one is engaged in tree-planting and obtains income from timber. Tree-planting can make the air better, and if there is a river nearby, it is also good for conservation of soil and water. However, the planter only obtains income from timber (private benefits), and cannot get the social benefits of clear air and conservation of soil and water. Thus, there is divergence between private and social benefits. The planter only calculates the private benefits to decide the optimal output of tree-planting according to MR＝MC, so it will be lower than that when the social benefits are also taken into account. Welfare economics thinks it is also a kind of market failure, and government should intervene with the market by subsidizing the planter so that the subsidies are equal to the external benefits of tree-planting and the planter will increase the output to the level that conforms to the social optimum (Pareto-optimality).

However, according to the Coase theorem introduced in the previous lecture, the real cause of externality (divergence between private and social costs or benefits) is not market failure, but government failure in not delineating property rights so that the costs or benefits brought by private behaviors cannot be borne or obtained through market transactions. The problem of factory pollution has been analyzed in detail in the previous lecture. As long as the rights of air are clearly delineated, no matter to the factory or the residents nearby, the final outcome through market transactions will be the same and Pareto-optimal, which means the external costs will be internalized (also become the private costs of the factory) and there will be no divergence between private and social costs.

The case of tree-planting can be analyzed similarly: as long as the rights of air are clearly delineated, regardless of the initial assignments, the final outcome through market transactions will be the same and Pareto-optimal, which means the external benefits will be internalized (also become the private benefits of the planter) and there will be no divergence between private and social benefits.

More specifically, if the rights are delineated to the planter, those who benefit from the better environment can pay to him in exchange for more tree-planting. As long as the MR of better environment is higher than the MC of the planter, and the payment is higher than MC and lower than MR, the parties involved have no reason to refuse the transactions. Those who benefit from the better environment will be paying until the MR falls to be equal to the MC of tree-planting due to the law of diminishing marginal returns (the law of increasing marginal costs).

On the contrary, if the rights are delineated to those who benefit from the better environment, they have the rights to require the planter to continuously plant tress to improve the environmental quality, but they do not have to bear the costs of tree-planting. Now it is the planter who will pay in exchange for reducing tree-planting. As long as the MC of the planter is higher than the MR of better environment, and the payment is higher than MR and lower than MC, the parties involved have no reason to refuse the transactions. The planter will be paying until the MC falls to be equal to the MR.

In fact, Coase theorem is precisely put forward to clarify that the real cause of externality or the problem of social costs is not market failure, but that property rights are not clearly delineated. Before Coase, when externalities or the divergence between private and social costs were discussed, welfare economists always suggested government to intervene with the market, not by delineating the property rights clearly, but by taxes or subsidies. It is wrong for welfare economics in failing to understand the real cause, let alone the real solution to the problem. What is more, if there is market failure, is there also government failure? How can government know better than the market how many external costs or benefits there are, then how can it know how many taxes or subsidies it should impose or provide? If government calculates less, there is still externality. And if it calculates more, there will be new externality that may be even more serious than the old problem without government’s intervention. What measurement is appropriate to determine how serious an externality is? Such ambiguity naturally opens the door for government to intervene with the market at will, which increases the power and income of government.

In other words, welfare economics and Keynes’s theory have the same fate: they seem to be so reasonable to be popular, but in fact they are only made use of by government. It is precisely why Keynes’s mistakes are now better known in the theoretical circle, but Keynes’s theory is still adopted by many governments in practical policies. Even worse, welfare economics is still widely recognized in both theoretical circle and practical policies.

A. C. Pigou (1877-1959), who inherited Marshall’s position as a lecture professor at Cambridge University, first put forward the concept of externality in welfare economics. In his “Welfare Economics” published in 1920, he gave the example of factory pollution. He also gave an example of a highway. There are two highways from city A to city B. One is short but narrow that can be called “Short Way”, and the other is long but wide that can be called “Long Way”. Of course, self-interested drivers will all choose to the “Short Way”, so each driver will make the “Short Way” more blocked, causing the others drive more slowly. However, every driver only cares about his own cost of time, and does not care about the external cost of making the “Short Way” more blocked and causing the others’ costs of time to rise, which means there is divergence between the private and social costs of time. The “Short Way” is getting more and more blocked, so at last there will be some drivers who will switch to the “Long Way”. In equilibrium, it will take the same time for the “Short Way” and the “Long Way”.

Pigou argued that government could force some drivers to switch to the “Long Way” by taxes without harming them. Since the time of the drivers on the “Short Way” is the same as that of those on the “Long Way”, while the “Short Way” will be less blocked with some drivers switching to the “Long Way”, those who continue to use the “Short Way” will be better-off. In other words, government’s taxes benefit some without harming anyone, which is Pareto- improvement. Pigou also calculated the so-called ideal tax that makes some drivers switch to the “Long Way” that the private costs of those who continue to use the “Short Way” are the same as the social costs.

However, after Pigou published this example, Knight criticized it as early as 1924, pointing out that the reason of the problem was that there were no PPRs for Pigou’s highways. If the “Short Way” is owned by someone, he will naturally collect an equally ideal toll, and the value and effect of it will be exactly the same as the ideal tax calculated by Pigou. In other words, Pigou thought the divergence between private and social costs implied market failure, while Knight responded that there was no market (no toll) due to the lack of PPRs, so it is not market failure, but government failure for no delineation of property rights.

To Knight’s criticism, Pigou’s reaction was to delete this example in the later version of “Welfare Economics”. He still kept the other examples, which shows that he did not really understand Knight’s criticism, or he would not admit he was wrong, so he only deleted the example criticized directly by Knight, but refused to completely abandon his “Welfare Economics” that analyzed the divergence between private and social costs with similar logic in the example of highways.